AMENDMENTS TO CLAIMS

Please amend the claims as shown below. A complete listing of all pending claims is presented.

1. (Currently-Amended) A liquid discharge device ~~comprising~~ comprises:

a head wherein deviation of the discharge direction of a liquid droplet, discharged from a liquid discharge portion having a nozzle, can be controlled so as to be selected from a plurality of directions along a predetermined direction,

wherein said liquid discharge portion comprises:

a liquid chamber for storing liquid which is to be discharged; and

a plurality of energy generating devices for generating energy for discharging said liquid stored within said liquid chamber from said nozzle;

wherein said plurality of energy generating devices are arrayed within said liquid chamber in said predetermined direction;

a discharge control circuit controls the discharge direction of a liquid droplet discharged from said nozzle by controlling the difference in energy occurring between at least two of said plurality of energy generating devices within said liquid chamber, and

wherein a plurality of liquid droplets are discharged so as to land on each pixel region for forming a pixel corresponding to said pixel region,

and wherein a target landing position of a liquid droplet which is to be discharged on each pixel region is determined at random,

and wherein the discharge direction of said liquid droplet which is to be discharged from said liquid discharge portion is controlled such that said liquid droplet lands at said determined target landing position.

2. (Currently-Amended) A liquid discharge device ~~comprising~~comprises:

a head wherein deviation of the discharge direction of a liquid droplet, discharged from a liquid discharge portion having a nozzle, can be controlled so as to be selected from a plurality of directions along a predetermined direction,

wherein said liquid discharge portion comprises:

a liquid chamber for storing liquid which is to be discharged; and

a plurality of energy generating devices for generating energy for discharging said liquid stored within said liquid chamber from said nozzle;

wherein said plurality of energy generating devices are arrayed within said liquid chamber in said predetermined direction;

a discharge control circuit controls the discharge direction of a liquid droplet discharged from said nozzle by controlling the difference in energy occurring between at least two of said plurality of energy generating devices within said liquid chamber, and

wherein a maximum of N (N denotes a positive integer) liquid droplets are discharged so as to land on each pixel region for forming a pixel corresponding to said pixel region,

and wherein M (M denotes an integer of 2 or more) different landing position candidates forming an array in said predetermined direction are determined such that at least a part of the landing liquid droplet region corresponding to each landing position candidate is included within said pixel region,

and wherein a target landing position of a liquid droplet is selected at random for each liquid droplet which is to be discharged from said liquid discharge portion, from an M number of said liquid landing position candidates,

and wherein the discharge direction of said liquid droplet which is to be discharged from said liquid discharge portion is controlled such that said liquid droplet lands at said determined target landing position.

3. (Original) A liquid discharge device according to Claim 2, wherein an N number of different landing position candidates forming an array in a direction different from said predetermined direction are determined such that at least a part of the landing liquid droplet region corresponding to each landing position candidate is included within said pixel region,

and wherein in the event that the number of the liquid droplets which are to be discharged onto a pixel region is equal to or greater than 1, and is less than N, a target landing position is selected at random from said liquid landing position candidates,

and wherein a liquid droplet is discharged so as to land at said determined landing position.

4. (Original) A liquid discharge device according to Claim 2, wherein control of said M number of target lading position candidates is performed using multi-bit signals,

and wherein said control system has a configuration wherein terminals of all said ink discharge portions for controlling the same bit are connected one to another for controlling the discharge direction of each ink discharge portion, or has a configuration wherein the discharge directions of all said ink discharge portions are controlled using the serialized signals.

5. (Currently-Amended) A liquid discharge device according to Claim 2,

wherein said head has a configuration wherein a liquid droplet can be discharged from a liquid discharge portion so as to land on the pixel region corresponding to the target landing position in a case of discharge being performed without deviation, from another liquid discharge portion near said liquid discharge portion,

and wherein in the event that two or more liquid droplets are discharged onto a pixel region, said ink liquid droplets are discharged from at least said two different liquid discharge portions positioned close one to another,

and wherein at least one of said liquid discharge portions discharge a liquid droplet with deviation.

6. (Currently-Amended) A liquid discharge device ~~comprising~~comprises:

a head including liquid discharge portions, each having a nozzle,

wherein each of said liquid discharge portions comprises:

a liquid chamber for storing liquid which is to be discharged; and

a plurality of energy generating devices for generating energy for discharging said liquid stored within said liquid chamber from said nozzle;

wherein said plurality of energy generating devices are arrayed within said liquid chamber in said predetermined direction;

a discharge control circuit controls the discharge direction of a liquid droplet discharged from said nozzle by controlling the difference in energy occurring between at least two of said plurality of energy generating devices within said liquid chamber, and

wherein a maximum of N (N denotes a positive integer) liquid droplets are discharged so as to land within each pixel region while relatively moving a recording medium where said liquid droplets are to be discharged, and said head, in a predetermined direction, for forming a pixel corresponding to said pixel region,

and wherein M (M denotes an integer of 2 or more) different landing position candidates forming an array in a direction generally vertical to said predetermined direction are determined such that at least a part of the landing liquid droplet region corresponding to each landing position candidate is included within said pixel region,

and wherein a target landing position of a liquid droplet is selected at random for each liquid droplet which is to be discharged from said liquid discharge portion, from an M number of said liquid landing position candidates,

and wherein the discharge direction of said liquid droplet which is to be discharged from said liquid discharge portion is controlled such that said liquid droplet lands at said determined target landing position,

and wherein in the event that two or more liquid droplets are discharged onto a pixel region, said two or more liquid droplets are discharged so as to land on two or more positions selected from said M number of target landing position candidates while relatively moving said recording medium and said head in said predetermined direction, for forming a pixel corresponding to said pixel region.

7. (Currently-Amended) A liquid discharge device ~~comprising~~comprises:

a head including a plurality of liquid discharge portions, each having a nozzle, arrayed in a predetermined direction,

wherein said liquid discharge portion comprises:

a liquid chamber for storing liquid which is to be discharged; and

a plurality of energy generating devices for generating energy for discharging said liquid stored within said liquid chamber from said nozzle;

wherein said plurality of energy generating devices are arrayed within said liquid chamber in said predetermined direction;

a discharge control circuit controls the discharge direction of a liquid droplet discharged from said nozzle by controlling the difference in energy occurring between at least two of said plurality of energy generating devices within said liquid chamber, and

wherein a maximum of N (N denotes a positive integer) liquid droplets are discharged so as to land within each pixel region while relatively moving a recording medium

where said liquid droplets are to be discharged, and said head, in a direction generally vertical to said predetermined direction, for forming a pixel corresponding to said pixel region,

and wherein M (M denotes an integer of 2 or more) different landing position candidates forming an array in said predetermined direction are determined such that at least a part of the landing liquid droplet region corresponding to each landing position candidate is included within said pixel region,

and wherein a target landing position of a liquid droplet is selected at random for each liquid droplet which is to be discharged from said liquid discharge portion, from an M number of said liquid landing position candidates,

and wherein the discharge direction of said liquid droplet which is to be discharged from said liquid discharge portion is controlled such that said liquid droplet lands at said determined target landing position.

8. (Original) A liquid discharge device according to any of Claims 2, 6, and 7, wherein said liquid discharge device includes a plurality of said heads;

and wherein different liquids are supplied to each of said heads,

a plurality of droplets are discharged from said liquid discharge portions of a plurality of said heads so as to land on each pixel region for forming a pixel corresponding to said pixel region.

9. (Currently-Amended) A liquid discharge method using a liquid discharge portion wherein a plurality of liquid droplets are discharged so as to land on each pixel region for forming a pixel corresponding to said pixel region,

wherein a target landing position of a liquid droplet which is to be discharged on each pixel region is determined at random,

and wherein the discharge direction of said liquid droplet is controlled such that said liquid droplet lands at said determined target landing position

wherein said liquid discharge portion comprises:

a liquid chamber for storing liquid which is to be discharged; and

a plurality of energy generating devices for generating energy for discharging said liquid stored within said liquid chamber from said nozzle;

wherein said plurality of energy generating devices are arrayed within said liquid chamber in said predetermined direction;

a discharge control circuit controls the discharge direction of a liquid droplet discharged from said nozzle by controlling the difference in energy occurring between at least two of said plurality of energy generating devices within said liquid chamber.

10. (Currently-Amended) A liquid discharge method using a liquid discharge portion wherein a maximum of N (N denotes a positive integer) liquid droplets are discharged so as to land on each pixel region for forming a pixel corresponding to said pixel region,

wherein said liquid discharge portion comprises:

a liquid chamber for storing liquid which is to be discharged; and

a plurality of energy generating devices for generating energy for discharging said liquid stored within said liquid chamber from said nozzle;

wherein said plurality of energy generating devices are arrayed within said liquid chamber in said predetermined direction;

a discharge control circuit controls the discharge direction of a liquid droplet discharged from said nozzle by controlling the difference in energy occurring between at least two of said plurality of energy generating devices within said liquid chamber, and

wherein a maximum of N (N denotes a positive integer) liquid droplets are discharged so as to land on each pixel region for forming a pixel corresponding to said pixel region,

and wherein M (M denotes an integer of 2 or more) different landing position candidates forming an array in a predetermined direction are determined such that at least a part of the landing liquid droplet region corresponding to each landing position candidate is included within said pixel region,

and wherein a target landing position of a liquid droplet is selected at random for each liquid droplet which is to be discharged, from an M number of said liquid landing position candidates,

and wherein the discharge direction of said liquid droplet is controlled such that said liquid droplet lands at said determined target landing position.

11. (Currently-Amended) A liquid discharge method using a liquid discharge portion wherein a maximum of N (N denotes a positive integer) liquid droplets are discharged so as to land within each pixel region while relatively moving a head including liquid discharge portions, each having a nozzle and a recording medium where said liquid droplets are to be discharged, in a predetermined direction, for forming a pixel corresponding to said pixel region,

wherein said liquid discharge portion comprises:

a liquid chamber for storing liquid which is to be discharged; and

a plurality of energy generating devices for generating energy for discharging said liquid stored within said liquid chamber from said nozzle;

wherein said plurality of energy generating devices are arrayed within said liquid chamber in said predetermined direction;

a discharge control circuit controls the discharge direction of a liquid droplet discharged from said nozzle by controlling the difference in energy occurring between at least two of said plurality of energy generating devices within said liquid chamber.

and wherein M (M denotes an integer of 2 or more) different landing position candidates forming an array in a direction generally vertical to said predetermined direction are

determined such that at least a part of the landing liquid droplet region corresponding to each landing position candidate is included within said pixel region,

and wherein a target landing position of a liquid droplet is selected at random for each liquid droplet which is to be discharged, from an M number of said liquid landing position candidates,

and wherein the discharge direction of said liquid droplet is controlled such that said liquid droplet lands at said determined target landing position,

and wherein in the event that two or more liquid droplets are discharged onto a pixel region, said two or more liquid droplets are discharged so as to land on two or more positions selected from said M number of target landing position candidates while relatively moving said recording medium and said head in said predetermined direction, for forming a pixel corresponding to said pixel region.

12. (Currently-Amended) A liquid discharge method using a liquid discharge portion wherein a maximum of N (N denotes a positive integer) liquid droplets are discharged so as to land within each pixel region while relatively moving a head including a plurality of liquid discharge portions, each having a nozzle, arrayed in a predetermined direction, and a recording medium where said liquid droplets are to be discharged, in a direction generally vertical to said predetermined direction, for forming a pixel corresponding to said pixel region,

wherein said liquid discharge portion comprises:

a liquid chamber for storing liquid which is to be discharged; and

a plurality of energy generating devices for generating energy for discharging said liquid stored within said liquid chamber from said nozzle;

wherein said plurality of energy generating devices are arrayed within said liquid chamber in said predetermined direction;

a discharge control circuit controls the discharge direction of a liquid droplet discharged from said nozzle by controlling the difference in energy occurring between at least two of said plurality of energy generating devices within said liquid chamber, and

and wherein M (M denotes an integer of 2 or more) different landing position candidates forming an array in said predetermined direction are determined such that at least a part of the landing liquid droplet region corresponding to each landing position candidate is included within said pixel region,

and wherein a target landing position is selected at random for each liquid droplet which is to be discharged, from an M number of said liquid landing position candidates,

and wherein the discharge direction of said liquid droplet is controlled such that said liquid droplet lands at said determined target landing position.

13. (Currently-Amended) A liquid discharge device ~~comprising~~comprises:

a head including a plurality of liquid discharge portions, each having a nozzle, arrayed in a predetermined direction, wherein a plurality of liquid droplets are discharged so as to land on each pixel region for forming a pixel corresponding to said pixel region,

wherein each of said liquid discharge portions comprises:

a liquid chamber for storing liquid which is to be discharged; and

a plurality of energy generating devices for generating energy for discharging said liquid stored within said liquid chamber from said nozzle;

wherein said plurality of energy generating devices are arrayed within said liquid chamber in said predetermined direction;

a discharge control circuit controls the discharge direction of a liquid droplet discharged from said nozzle by controlling the difference in energy occurring between at least two of said plurality of energy generating devices within said liquid chamber, and

wherein the discharge direction of a liquid droplet discharged from said nozzle of said liquid discharge portion is controlled so as to be selected from a plurality of discharge directions such that deviation of the landing position occurs in said predetermined direction,

and wherein at least two different liquid discharge portions discharge liquid droplets in directions different one from another such that a plurality of liquid droplets land on said one pixel region,

and wherein a target landing position of a liquid droplet which is to be discharged on a pixel region is selected from landing position candidates at random,

and wherein the discharge direction of a liquid droplet which is to be discharged from said liquid discharge portion is controlled such that said liquid droplet lands at said determined target landing position.

14. A liquid discharge device ~~comprising~~ comprises:

a head including a plurality of liquid discharge portions, each having a nozzle, arrayed in a predetermined direction, wherein a maximum of N (N denotes a positive integer) liquid droplets are discharged so as to land on each pixel region for forming a pixel corresponding to said pixel region, comprising:

discharge direction varying means for controlling the discharge direction of a liquid droplet discharged from said nozzle of each liquid discharge portion such that deviation of the landing position occurs in said predetermined direction;

first discharge control means for performing discharge control using said discharge direction varying means such that ink liquid droplets are discharged from at least said two different liquid discharge portions positioned close one to another, in the discharge directions different one from another, so as to land at the same pixel column or the same pixel region for forming a pixel column or a pixel; and

second discharge control means for performing discharge control using said discharge direction varying means such that a landing position is selected for each liquid-droplet discharge from said liquid discharge portion, from an M (M denotes an integer of 2 or more) number of different landing position candidates forming an array in said predetermined direction, determined such that at least a part of the landing liquid droplet region corresponding to each landing position candidate is included within said pixel region, and a liquid droplet is discharged so as to land at said determined landing position,

and wherein said discharge direction varying means controls the liquid-droplet discharge direction from said nozzle using control signals with the bit number of J (J denotes a positive integer) so as to select a discharge direction from an even number 2^J of different discharge direction candidates.

and wherein the maximal distance between the landing positions corresponding to the said 2^J different direction candidates are determined to the value wherein the interval between the adjacent nozzles 18 is multiplied by $(2^J - 1)$,

and wherein said first discharge control means selects one direction from said 2^J different direction candidates at the time of liquid-droplet discharge from said nozzle of said liquid discharge portion.

15. (Canceled)

16. (Currently-Amended) A liquid discharge device ~~according to Claim 14~~comprises:

a head including a plurality of liquid discharge portions, each having a nozzle, arrayed in a predetermined direction, wherein a maximum of N (N denotes a positive integer) liquid droplets are discharged so as to land on each pixel region for forming a pixel corresponding to said pixel region, comprising:

discharge direction varying means for controlling the discharge direction of a liquid droplet discharged from said nozzle of each liquid discharge portion such that deflection of the landing position occurs in said predetermined direction;

first discharge control means for performing discharge control using said discharge direction varying means such that ink liquid droplets are discharged from at least said two different liquid discharge portions positioned close one to another, in the discharge directions different one from another, so as to land at the same pixel column or the same pixel region for forming a pixel column or a pixel; and

second discharge control means for performing discharge control using said discharge direction varying means such that a landing position is selected for each liquid-droplet discharge from said liquid discharge portion, from an M (M denotes an integer of 2 or more) number of different landing position candidates forming an array in said predetermined direction, determined such that at least a part of the landing liquid droplet region corresponding to each landing position candidate is included within said pixel region, and a liquid droplet is discharged so as to land at said determined landing position,

and wherein said discharge direction varying means controls the liquid-droplet discharge direction from said nozzle using control signals with the bit number of J + 1 (J denotes a positive integer) so as to select a discharge direction from an odd number ($2^J + 1$) of different discharge direction candidates,

and wherein the maximal distance between the landing positions corresponding to the said ($2^J + 1$) different direction candidates are determined to the value wherein the interval between the adjacent nozzles 18 is multiplied by 2^J,

and wherein said first discharge control means selects one direction from said ($2^J + 1$) different direction candidates at the time of liquid-droplet discharge from said nozzle of said liquid discharge portion.

17. (Original) A liquid discharge device according to Claim 14, wherein said second discharge control means selects a landing position from said M different landing position candidates at random.

18. (Original) A liquid discharge device according to Claim 14, further comprising third discharge control means for performing control of liquid-droplet discharge such that said N different landing position candidates forming an array in a direction different from said predetermined direction, are determined such that at least a part of the landing liquid droplet region corresponding to each landing position candidate is included within said pixel region, and in the event that the number of the liquid droplets which are to be discharged onto a pixel region is equal to or greater than 1, and is less than N, a target landing position is selected from said N different liquid landing position candidates, and a liquid droplet is discharged so as to land at said determined landing position.

19. (Original) A liquid discharge device according to Claim 14, further comprising third discharge control means for performing control of liquid-droplet discharge such that said N different landing position candidates forming an array in a direction different from said predetermined direction, are determined such that at least a part of the landing liquid droplet region corresponding to each landing position candidate is included within said pixel region, and in the event that the number of the liquid droplets which are to be discharged onto a pixel region is equal to or greater than 1, and is less than N, a target landing position is selected at random from said N different liquid landing position candidates, and a liquid droplet is discharged so as to land at said determined landing position.

20. (Original) A liquid discharge device according to Claim 14, wherein said liquid discharge portion comprises:

a liquid chamber for storing liquid which is to be discharged; and

a plurality of energy generating devices for generating energy for discharging said liquid stored within said liquid chamber from said nozzle;

wherein said plurality of energy generating devices are arrayed within said liquid chamber in said predetermined direction;

and wherein said discharge direction varying means controls the discharge direction of a liquid droplet discharged from said nozzle by controlling the difference in energy occurring between at least two of said plurality of energy generating devices within said liquid chamber.

21. (Original) A liquid discharge device according to Claim 14, wherein a plurality of said heads are arrayed in a particular direction so as to form a line head.

22. (Original) A liquid discharge device according to Claim 14, wherein said first discharge control means and said second discharge control means are disposed on said head or a board for controlling or driving said head.

23. (Currently-Amended) A liquid discharge device according to Claim 14, wherein said first discharge control means determines the deviation direction and the amount of deviation, at the time of determining the discharge direction of a liquid droplet which is to be discharged from said liquid discharge portion.

24. (Original) A liquid discharge device according to Claim 14, wherein the liquid-droplet discharge control by said first discharge control means and the liquid-droplet discharge control by said second discharge control means have a predetermined relation, such that upon either liquid-droplet discharge control is determined, the other liquid-droplet discharge control is automatically determined.

25. (Original) A liquid discharge device according to Claim 14, wherein said discharge direction varying means controls the discharge direction of a liquid droplet so as to select a discharge direction from a plurality of discharge direction candidates symmetrical as to a line generally vertical to said predetermined direction passing through the center of nozzle.

26. (Currently-Amended) A liquid discharge method for discharging a plurality of liquid droplets so as to land on each pixel region for forming a pixel corresponding to said pixel region, using a head including a plurality of liquid discharge portions, each having a nozzle, arrayed in a predetermined direction,

wherein said liquid discharge portion comprises:

a liquid chamber for storing liquid which is to be discharged; and

a plurality of energy generating devices for generating energy for discharging said liquid stored within said liquid chamber from said nozzle;

wherein said plurality of energy generating devices are arrayed within said liquid chamber in said predetermined direction;

a discharge control circuit controls the discharge direction of a liquid droplet discharged from said nozzle by controlling the difference in energy occurring between at least two of said plurality of energy generating devices within said liquid chamber,

and wherein the discharge direction of a liquid droplet discharged from said nozzle of said liquid discharge portion is controlled so as to be selected from a plurality of discharge directions such that deviation of the landing position occurs in said predetermined direction,

and wherein at least two different liquid discharge portions discharge liquid droplets in directions different one from another such that a plurality of liquid droplets land on said one pixel region,

and wherein a target landing position of a liquid droplet which is to be discharged on a pixel region is selected from landing position candidates at random,

and wherein the discharge direction of a liquid droplet which is to be discharged from said liquid discharge portion is controlled such that said liquid droplet lands at said determined target landing position.

27. (Currently-Amended) A liquid discharge device for discharging a maximum of N (N denotes a positive integer) liquid droplets so as to land on each pixel region for forming a pixel corresponding to said pixel region, using a head including a plurality of liquid discharge portions, each having a nozzle, arrayed in a predetermined direction,

wherein the discharge direction of a liquid droplet discharged from said nozzle of each liquid discharge portion is controlled such that deviation of the landing position occurs in said predetermined direction;

and wherein discharge control is performed such that ink liquid droplets are discharged from at least said two different liquid discharge portions positioned close one to another, in the discharge directions different one from another, so as to land at the same pixel column or the same pixel region for forming a pixel column or a pixel;

and wherein discharge control is performed, using said discharge direction varying means such that a landing position is selected for each liquid-droplet discharge from said liquid discharge portion, from M (M denotes an integer of 2 or more) different landing position candidates forming an array in said predetermined direction, determined such that at least a part of the landing liquid droplet region corresponding to each landing position candidate is included within said pixel region, and a liquid droplet is discharged so as to land at said determined landing position,

and wherein said discharge direction varying means controls the liquid-droplet discharge direction from said nozzle using control signals with the bit number of J + 1 (J denotes a positive integer) so as to select a discharge direction from an odd number ($2^J + 1$) of different discharge direction candidates,

and wherein the maximal distance between the landing positions corresponding to the said ($2^J + 1$) different direction candidates are determined to the value wherein the interval between the adjacent nozzles 18 is multiplied by 2^J,

and wherein said first discharge control means selects one direction from said (2^J + 1) different direction candidates at the time of liquid-droplet discharge from said nozzle of said liquid discharge portion.